Caution Bulletin

Insufficient Foreign Material Exclusion Controls

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Summary: Sound engineering, construction, and operating practices were not applied with regard to foreign material exclusion during the design, construction, and operation of the Sludge Containerization and Sludge Hose-in-Hose Transfer Projects. Project personnel failed to recognize the need for foreign material exclusion (FME) controls to maintain the integrity of their nuclear facility systems.

Discussion of Activities: The Fluor Hanford Sludge Containerization and Hose-in-Hose (HIH) Transfer Project were designed to containerize and pump radioactive sludge located in Hanford's 100 Area K-East Facility to containers located at the K-West Facility. On several occasions the HIH pumps lost suction resulting in shut downs to trouble shoot and back-flush portions of the system. During the back flushing operations, material larger than 0.25" inch diameter, the maximum size the system was designed to carry, was discovered. Items such as a nut, tape, and a ball point pen, were discovered in the HIH system.

Analysis: The sludge containerization system design included 0.25 inch strainers primarily to prevent fuel from entering the containers during vacuuming operations. Therefore, the sludge collected in the containers was assured to be less than 0.25 inches in diameter. However, measures were not taken to assure foreign material could not enter the open containers, or if foreign material was able to enter the containers that it would be prevented from entering the HIH system during subsequent transfer to the K West Basin. The lack of adequate foreign material controls led to avoidable delays for the sludge containerization and transfer projects.

The project failed to realize that settler tubes over the containers and the container covers would not preclude entrance of foreign material into the sludge containers. Additionally, some foreign material entered the containers during construction.

When the HIH transfer system was designed, the maximum particle size was assumed to be 0.25 inches based on the definition of sludge, and the possibility of larger foreign material entering via the open top containers was not recognized or considered. FH procedures and practices did not specifically address requirements for foreign material exclusion during design.

Recommendations/Actions:

All facilities should be aware of the new procedure HNF-PRO-33415 "Structures, Systems, Components Cleaning/Cleanliness and Foreign Material Exclusion and Components.

Facilities/Projects/Programs should look for FME vulnerabilities related to current and ongoing projects.

Cost Savings/Avoidance: Not Identified

Work Function: Engineering and Design-Nuclear

Hazards: Not Identified

ISM Core Functions: Define Work, Develop/Implement Controls

Keywords: Design criteria, exclusion zone, foreign material, nuclear, sludge, hose-in-hose

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References: S-07-SED-SNF-003